Supreme Court, U.S.
FILED

011334 MAR - 7 2002

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No. 01-

IN THE

Supreme Court of the United States

BRADLEY W. BOSWELL, D.V.M.,

Petitioner,

v.

UNITED STATES OF AMERICA,

Respondent.

ON PETITION FOR A WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE EIGHTH CIRCUIT

PETITION FOR A WRIT OF CERTIORARI

EDWARD M. MANSFIELD
Counsel of Record
BELIN LAMSON MCCORMICK
ZUMBACH FLYNN
A Professional Corporation
666 Walnut Street
2000 Financial Center
Des Moines, IA 50309-3989
(515) 243-7100

Attorneys for Petitioner

172609

COUNSEL PRESS
(800) 274-3321 • (800) 359-6859

5438

QUESTION PRESENTED FOR REVIEW

In recent years, use of DNA evidence in the courts has proliferated. However, courts generally have not admitted DNA results unless the proponent of the evidence establishes the procedures that were followed. The United States Court of Appeals for the Eighth Circuit has carved out an exception. Through judicial notice and other doctrines, the Eighth Circuit has turned the tables, creating a presumption that DNA evidence is admissible even when the proponent of the evidence has failed to show how it was gathered.

The question presented is whether Federal Rule of Evidence 702 permits a federal court to admit DNA evidence without proof – through a protocol or other means – of the actual test that was performed.

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The petitioner, Dr. Bradley W. Boswell, respectfully requests that this Court issue a writ of certiorari to review the judgment and opinion of the United States Court of Appeals for the Eighth Circuit, which was entered on October 16, 2001, and on which rehearing was denied December 7, 2001.

OPINION BELOW

The opinion of the Eighth Circuit is published at 270 F.3d 1200, and is reproduced in the Appendix at 1a-11a. The oral ruling of the district court is reproduced in the Appendix at 24a.

STATEMENT OF JURISDICTION

The judgment to be reviewed was entered on October 16, 2001. Rehearing by the panel and rehearing en banc were denied on December 7, 2001, although Judges McMillian and Bye would have granted rehearing en banc. *See* Appendix 12a. Jurisdiction is conferred on this Court by 28 U.S.C. § 1254. The district court had jurisdiction pursuant to 18 U.S.C. § 3231.

RULE INVOLVED

At the time of trial, Federal Rule of Evidence 702 provided:

> If scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by

knowledge, skill, experience, training, or education, may testify thereto in the form of an opinion or otherwise.

STATEMENT OF THE CASE

1. This case was a false statements prosecution of a veterinarian. The indictment charged that the veterinarian had incorrectly reported the number of pigs from which he had drawn serum samples for government-reimbursed pseudorabies testing. The veterinarian was acquitted of most of the charges. However, the district court allowed into evidence a report from a DNA test performed by an uncertified, commercial lab on three pairs of serum samples from one farm. Purportedly, the test results showed that the three pairs did not come from the same pigs, which would have been inconsistent with the veterinarian's written serology forms. As a result, the veterinarian was convicted on the two counts of the indictment relating to these samples.

No protocol was ever provided for the DNA test. Normally, DNA testing is not performed on serum, which contains little if any DNA. Notably, this case did not involve a DNA "match," which might be difficult to explain through cross-contamination, but a DNA "no-match," which easily could have resulted from cross-contamination.

2. Dr. Boswell is a 45-year-old veterinarian practicing in Pella, Iowa. He participates in the government's pseudorabies testing program.

Pseudorabies is a contagious air-transmitted disease that causes respiratory and reproductive problems in swine, although it does not affect the suitability of their meat for

human consumption. The government pays veterinarians to provide samples on which a laboratory performs pseudorabies testing.

From the veterinarian's perspective, the program essentially works as follows. The veterinarian will visit a hog farm selected by the Animal and Plant Health Inspection Service (APHIS) of the U.S. Department of Agriculture. Usually with the assistance of a helper, the veterinarian will catch a number of pigs from which blood will be drawn. The veterinarian uses a needle and syringe to draw a blood sample from the neck of each pig to be tested, labels each sample tube, puts the sample tubes in a portable cooler (if it is a hot day), and brings the samples back to his or her office. Later, at the office, the veterinarian will "spin down" or centrifuge each sample, eliminating the heavier material (cells and platelets), so as to prepare a tube of serum from each sample. Then, the veterinarian mails the serum tubes to a laboratory for pseudorabies antibody testing.

The veterinarian supplies all equipment at his/her own expense (including the test tubes, needles, and syringes) except for a mailer box provided by the government. For this work, the veterinarian receives $20 per farm stop plus $4.50 for each pig from which blood is drawn.

Typically, veterinarians re-use the same needle and syringe to draw blood from the necks of several pigs, with only a water rinse in between. Also, the same water is used over and over for rinsing purposes. These nonsterile conditions are deemed sufficient for pseudorabies antibody testing, especially because the concern is with determining the status of the herd (infected or not), not that of individual animals.

The centrifuge process performed at the veterinarian's office usually yields more serum from each pig than the 1 ml. needed for the laboratory to test for pseudorabies. Hence, veterinarians often keep leftover serum for possible retests of the same samples. Resubmissions or retests do not result in any additional compensation to the veterinarian.

At the testing lab, a technician typically pipettes the serum samples onto a plate, where they incubate, until a computer "reads" them and compares them to certain "control" samples. The pseudorabies antibody test uses a scale from 0 to 1.0. Above .70 is considered negative, .60 to .70 is considered "suspect," and below .60 is considered positive. A "weak positive" is anything between .35 and .60. The test report indicates whether a farm contains pigs that have been exposed to pseudorabies.

3. In this case, an APHIS veterinarian named Alison King asked Dr. Boswell in early 1998 to bleed pigs from the Thad Benskin farm and prepare serum samples for pseudorabies testing. Benskin's farm contained approximately 300 sows, divided into groups that rotated. Customarily, one refers to the size of an operation by the number of sows (adult female pigs), although a farm of course will have many more total pigs than the number of sows, including male pigs and immature female pigs.

Dr. Boswell maintains that he made two separate trips to the Benskin farm in February 1998 and bled a total of 120 pigs, which was the same number of samples he submitted to the lab for testing. The government claimed, however, that Dr. Boswell only visited the farm once and bled approximately 40-60 pigs with the assistance of Thad Benskin. Dr. Boswell testified that after bleeding pigs

for several hours with Mr. Benskin's help, he had to return a second day with Bart Elder, another local farmer, to finish the job. Mr. Elder corroborated Dr. Boswell's testimony. Like many Iowa farmers, Mr. Benskin had another job and was often away from his farm during the day.

In any event, Dr. Boswell mailed 120 Benskin serum samples to Iowa State University's pseudorabies testing lab. Sixty of the samples reached the lab on Wednesday, February 18, 1998, were tested that day, and tested negative. Thirty of the samples arrived on Thursday, February 19, 1998, were tested that day, and tested negative.

The last box of 30 Benskin serum samples (the large sows) reached the ISU lab by mail on Saturday, February 21, 1998, and were not tested until the following Monday morning, February 23. The tests performed on these 30 samples showed that ten were negative, thirteen were weak positive, and seven were suspect. The lab did not retest the large sow samples, although the former director of the ISU lab testified that a retest on positive or suspect samples would have been standard procedure.

An individual from the lab placed a call to Dr. Boswell and left a message with his wife. The message indicated that there was a "problem" with the serum samples and requested that Dr. Boswell submit more samples. Dr. Boswell submitted additional serum for testing that he had retained from the 30 large sow samples. These 30 "resubmissions" reached the ISU lab on Tuesday, March 3, 1998, were tested that day, and tested negative for pseudorabies.

Dr. Boswell then left a message with the APHIS veterinarian to alert her to these inconsistent results.

He also said in his voicemail that he would be drawing new samples from the Benskin herd. (This rebleeding likewise turned out negative.) However, the APHIS veterinarian did not believe that serum originating from the same blood samples could test positive and then negative. Suspecting that Dr. Boswell had not really bled 120 different pigs at the Benskin farm, APHIS began a fraud investigation.

Nevertheless, another veterinarian, who headed the Iowa Pseudorabies Advisory Committee, testified at trial that he had similar "false positive" experiences with the ISU lab during that timeframe. In fact, he had made three separate submissions from a single serum sample in early 1998 and had received contradictory reports of "suspect," "positive," and "negative" respectively from the lab. Moreover, the director of the ISU lab, whom the government did *not* call as a witness, had expressed concern about test kit problems during this time period.

False positives can occur for several reasons. The controls may not have been set properly. There could be test kit problems. Or, human error could have occurred. Indeed, there was undisputed testimony that with this test kit, the same samples can vary by .5 on a 1.0 total scale – enough to make a .9 (negative) a .4 (positive). One of Dr. Boswell's experts, a professor who develops diagnostic tests and had utilized this pseudorabies antibody test, hypothesized that the controls had not been calibrated correctly when the lab re-started testing on Monday morning, February 23. He analogized this situation to the maxim, "Don't buy a car that is made on a Friday or a Monday," and said he would be concerned about the accuracy of the first tests run on a Monday morning.

Significantly, the only other samples from Dr. Boswell that had arrived at the ISU lab over the weekend and were not tested until the following Monday also produced some initial weak positives. These samples came from another farm which the government always concedes was "negative." As with the Benskin farm, these results did not recur when the tests were run on resubmitted samples.

Still, APHIS directed that a number of Dr. Boswell's samples from various farms (including the Benskin farm) be sent out for fraud screening. Hence, some of the serum samples were removed from the ISU freezer, defrosted, and transported five miles from the ISU lab to the National Veterinarian Service Laboratory. This was the second time they had been frozen and defrosted because Dr. Boswell had frozen the serum samples to preserve them before mailing them to ISU.

At NVSL, an individual who had started her job just two weeks before performed some crude eyeball testing using a refractometer. She concluded that some (but not all) of the samples were too dilute to have come from a living animal. No one checked her work.

There was a logical explanation for the refractometer readings. The freezing and thawing out process causes the proteins to salt down (like what happens to soup when you freeze it), so the protein levels in the upper phase should be expected to be very low. In fact, one of Dr. Boswell's experts previously had obtained very low readings with serum that had been frozen. The former head of the ISU lab – whom Dr. Boswell also called as a witness – also confirmed that frozen serum leads to stratification.

Nonetheless, in late March 1998, this NVSL employee in Iowa concluded that Dr. Boswell must have "diluted" serum samples. So, to try to confirm this, she sent three samples from the original Benskin submission and three corresponding samples from the Benskin resubmission to Stormont Labs in California.

Stormont Labs is not a crime lab. It is not a certified lab. It is a private, for-profit company that primarily does animal pedigree testing on whole blood samples that have been specially drawn for that purpose. DNA testing is not usually performed on *serum*, which normally contains only trace quantities of DNA. To save money, the NVSL employee sent only these six samples to Stormont (out of 120 original Benskin samples and 30 resubmitted samples).

On April 8, 1998, Michael Spencer, a technician with a bachelor's degree who worked at Stormont, apparently ran a DNA test on the three pairs of samples. According to his trial testimony, which the trial judge admitted over Dr. Boswell's objections, the test report showed that the three pairs of serum samples did not match each other. In the government's view, this meant that the original submissions and the resubmissions did not come from the same pigs and thus that Dr. Boswell had committed fraud. The government conducted no further confirmatory testing on samples provided by Dr. Boswell.

The contaminated and deteriorated condition of the samples was undisputed. As noted, the same needle and syringe had been reused on many pigs to draw the blood in the first place. That is sufficient for pseudorabies antibody testing but does not work for DNA testing. Furthermore, when the original testing occurred at ISU, the same pipette was

used and reused on multiple samples without the special barrier tip that is required for DNA testing, providing additional opportunities for cross-contamination. And, each of these samples had been handled by numerous individuals, routed through several locations, and frozen and refrozen at least twice before reaching Stormont in California.

After the government received the Stormont report, it sent several agents to the Benskin farm on April 16, 1998. At that time, the government drew its own serum samples from 30 sows, and found that ten of the 30 tested positive for pseudorabies. However, the incubation period for pseudorabies is only five-to-seven days. It is entirely possible that these pigs became positive during the time that elapsed between Dr. Boswell's drawing of samples and the government's drawing of samples. Or, the government could have drawn blood from different pigs.

Two years later, the government charged Dr. Boswell. The government has never explained what it thought Dr. Boswell did. For example, if Dr. Boswell had been falsifying samples, why would he have voluntarily resubmitted serum samples when questions were raised about the first round of tests? Dr. Boswell was not required to keep or submit leftover serum, and he received no compensation for doing so. It also defies logic why a person committing fraud would have called APHIS and alerted it to the conflicting results from the ISU lab. By Dr. King's own admission, this is what caused her to look into the matter. Also, why would anyone go to the trouble of "diluting" samples (for $4 per sample!), since the bleeding yields enough serum for multiple samples? Additionally, why would a person "dilute" some samples – but not others in the same

submission? And why submit fraudulent samples that are positive? These are just a few of the many unanswered questions in this case.

4. The government knew that the Stormont DNA test results on the three sets of Benskin samples were essential to any possibility of a conviction, but it had three problems:

First, the government did not have the actual protocol that had been followed by Stormont Labs to perform pig DNA testing. At the time of trial, Stormont no longer conducted DNA testing on pigs and the pig protocol was unavailable. Appendix 14a. Dr. Boswell and his attorneys had repeatedly asked for the protocol, but it was never provided. Mr. Spencer testified there had been a written protocol for pigs, but he could not recall it:

> Q. But I mean you don't know what that [the protocol] was exactly?
>
> A. I could not produce it from my head, no.

Appendix 22a.

Second, Mr. Spencer had no advanced degree and was not the person who developed the protocol for pig DNA testing at Stormont. He simply ran the tests. He had joined Stormont just a few months out of college, and he was not even authorized to sign the test report.

Third, the government did not have evidence that the Stormont pig DNA test – whatever it was – had any validity under the actual conditions under which it was run. There was no evidence that the test had ever been run

successfully on deteriorated and contaminated serum. Mr. Spencer had no knowledge of the prior handling of the samples, and could only say that taking blood samples from different animals with the same syringe and needle would increase the possibility of contamination, and contamination from another pig's DNA could "drown out" the DNA of the pig from which the sample was drawn.

Thus, the government went through a series of gyrations to try to get the DNA test report into evidence. First, the government tried unsuccessfully to bring in a Stormont Labs *horse* protocol through Mr. Spencer as foundation for the pig DNA test report. That was rejected by the trial court. Then, the government tried to rely on some journal articles, but this effort was quashed when Mr. Spencer had to admit that modifications at Stormont had been made from the journal articles, and that the changes were not a recognized procedure. Once again, the trial court stepped in – and excused the jury. Appendix 16a.

Mr. Spencer, now testifying to the court alone, said that the pig protocol (even though he was not able to describe it) had been used many times without complaint by Stormont's customers. Appendix 17a-21a. At that point, the district court admitted the test report. Appendix 24a.

Throughout the trial, the government called only technicians as witnesses. The government presented no scientific testimony from qualified scientists on the validity of the tests, especially under the conditions on which they were run. Indeed, one of these technicians (whose academic credentials consisted of a cosmetology degree) made a flippant remark for the benefit of the jury about experts who "tell[] you the big words."

Thus, it was left to Dr. Boswell to present scientific testimony. Dr. Boswell's experts included the head of the animal DNA testing lab at South Dakota State (Dr. Christopher Chase), the former head of the ISU pseudorabies lab, and the Chairman of Iowa's Pseudorabies Advisory Committee. All testified without rebuttal regarding the total lack of reliability in the government's reports. Dr. Chase, in particular, testified that the DNA testing was not scientifically valid because there was no protocol as to what was actually done and there were no controls. As he put it, "[I]f it's irreproducible, then it's not valid." Given how the serum samples had been handled and the multiple opportunities for contamination, Dr. Chase added that there was "no way" to conclude that the results reflected DNA from the animals from which the samples were originally taken.

5. After lengthy jury deliberations, Dr. Boswell was convicted on only two counts of the indictment. The jury found him guilty on Count IV, which charged that the original Benskin submission was fraudulent, and on Count V, which charged that the Benskin resubmission was fraudulent. Thus, Dr. Boswell was convicted only of the charges that were covered by the Stormont Labs report, which purportedly compared three samples from the original Benskin submission to three samples from the Benskin resubmission. Dr. Boswell was acquitted of all other charges involving other submissions and/or other farms.

With commendable candor, the trial judge granted Boswell's motion for release pending appeal, stating on the record that he was "troubled" by his ruling admitting the DNA evidence, that he had a confidence level just a little above 50 percent in its correctness, and that he did "the

practical thing," knowing that if he erred, the appellate court could rectify the error. The district judge also concluded that if his decision to admit the DNA evidence were reversed, a new trial would be required on both Count IV and Count V, because the counts were intertwined and the DNA evidence pertained to both counts.

6. On appeal, the Eighth Circuit affirmed Dr. Boswell's convictions. At the beginning of its opinion, the court of appeals recounted an old incident from Dr. Boswell's career. Appendix 2a. The reference was inappropriate. The district court had excluded the matter as irrelevant and it had not been presented to the jury.

The court of appeals then considered, and overruled, Dr. Boswell's contention that the district court had committed reversible error in admitting the DNA evidence. In particular, the Eighth Circuit conceded that no written protocol was introduced, but claimed that this was unnecessary because (a) prior judicial decisions authorized the admission of PCR DNA testing, (b) Mr. Spencer had identified the "basic components" of the "testing methodology," and (c) Mr. Spencer had "verified that the procedure was an accepted one among DNA experts." Appendix 6a-7a. However, as noted, Mr. Spencer had testified only that, to his knowledge, *clients* of Stormont had accepted the test results without challenge. Appendix 17a-21a.

Turning to Dr. Boswell's challenge to Mr. Spencer's qualifications, the panel claimed that he was "a biochemist from the University of California, at Davis." Appendix 6a. However, Mr. Spencer had only an undergraduate degree in biochemistry. He stayed on for a few months working in the biochemistry department after graduating – then joined Stormont Labs. Mr. Spencer had no advanced degree.

Lastly, the panel used the following sentence to reject Dr. Boswell's argument that the government had failed to offer proof that the Stormont Labs test was valid under actual conditions: "This assertion is contradicted by Mr. Spencer who stated that the samples were delivered [to Stormont] in a sealed container by express courier and were then stored in a secure laboratory refrigerator." Appendix 7a. However, the issue was not how the samples were handled after they reached Stormont, but what happened during the six weeks before they got there. No witness testified that the Stormont test had any validity given the previous treatment of the serum samples. Rather, the only witness who was familiar with those conditions testified there was "no way" to tell whether the Stormont test results reflected the DNA of the original animals from which blood was drawn.

Dr. Boswell petitioned for panel rehearing and rehearing en banc. The Eighth Circuit denied the petition, although two judges would have granted rehearing en banc. Appendix 12a.

REASONS WHY THE WRIT SHOULD BE GRANTED

Our legal system does not allow convictions by the "black box." For a scientific test to be admitted, there must be proof of the test that was run. This is not just law. It is first and foremost science. As one of Dr. Boswell's experts put it, "[I]f it's irreproducible, then it's not valid." Black boxes, such as the Stormont report in this case, are not valid science because they violate the very basic rule that another scientist must be able to come along afterward and figure out what was done. Most people learn this proposition when they are taking their first lab science class in high school.

Certiorari should be granted here for two reasons. First, the Eighth Circuit's decision conflicts with relevant decisions of this Court and other circuits. In fact, the Eighth Circuit's decision represents the culmination of a disturbing trend in that circuit's decisions on DNA evidence. Second, the Eighth Circuit has erred on a vitally important question of federal law. Indeed, it would be difficult to conceive of an evidentiary question that is more important today than the standards for admission of DNA evidence. Yet under the rule in this case, parties who wish to utilize DNA evidence need not prove the specific procedures that were followed, but only have to bring in a technician to testify that prior customers have not "challenged" the procedure. This reduces science to the level of a Better Business Bureau.

I. The Eighth Circuit's Decision Conflicts With Decisions of This Court and Other Circuits.

Since this Court's decision in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993), it has been the law that the admissibility of scientific testimony in federal courts must be governed by *scientific* principles. Not "scientific" as that term is used by Yul Brynner in "The King and I," but "scientific" as scientists use it. Thus, in *Daubert*, this Court imposed a requirement that federal courts make a "preliminary assessment of whether the reasoning or methodology underlying the testimony is scientifically valid. . . ." *Id.* at 592-93. The "overarching subject [of an inquiry under Federal Rule of Evidence 702] is the scientific validity . . . of the principles that underlie a proposed submission." *Id.* at 594-95. "The adjective 'scientific' implies a grounding in the methods and procedures of science." *Id.* at 590. Testimony that does not

meet these scientific standards must be screened out by federal judges performing their "gatekeeping" role before it is heard by a jury. *Id.* at 597.

In *Kumho Tire Co., Ltd. v. Carmichael*, 526 U.S. 137 (1999), this Court both broadened and reaffirmed *Daubert*. It held that the *Daubert* principles were not limited to strictly "scientific" evidence. *Id.* at 147-48. And, it characterized the judge's gatekeeping role as one of insuring that an expert "employs in the courtroom the same level of intellectual rigor that characterizes the practice of an expert in the relevant field." *Id.* at 152. *Daubert* and *Kumho Tire* exemplify the "increasingly important need for law to reflect sound science." Reference Manual on Scientific Evidence 5 (2d ed. 2000).

In circuits other than the Eighth, these principles have led to a clearcut post-*Daubert* rule that results of scientific testing may not be admitted under Rule 702 without proof of the test that was actually run. The "protocol" is the focal point of judicial gatekeeping, because without a protocol there is no way even to perform the *Daubert* inquiry. How can one say that a procedure is "reliable" without knowing what that procedure was? The protocol is fundamental to a scientific approach in the same sense that the citation of publicly available legal authorities is basic to judicial reasoning. If courts could cite "hidden" or "secret" precedents for their decisions, they could justify anything.

Thus, in *United States v. Bonds*, 12 F.3d 540, 556 (6th Cir. 1993), the Sixth Circuit upheld the admission of the DNA evidence only because the district court had "issued exhaustive findings" on the procedures that were followed by the FBI. Similarly, in *United States v. Davis*,

40 F.3d 1069, 1075 (10th Cir. 1994), *cert. denied*, 514 U.S. 1029, 1088 (1995), the Tenth Circuit upheld the admission of DNA evidence because the government produced an agent to testify regarding the procedures that were actually used. And, in *United States v. Hicks*, 103 F.3d 837, 846 (9th Cir. 1996), *cert. denied*, 520 U.S. 1193 (1997), the court admitted the DNA evidence only after "extensive evidence on the procedures and protocols used to avoid contamination." *See also United States v. Trala*, 162 F. Supp.2d 336, 349 (D. Del. 2001) ("the government presented ample evidence at the hearing that the FBI protocol for PCR/STR analysis contains substantial controls and procedures for preventing contamination"); *United States v. Gaines*, 979 F. Supp. 1429, 1435-36 (S.D. Fla. 1997) (pretrial hearing showed that all sampling was performed in accordance with the FBI Laboratory protocol, which was admitted into evidence); *United States v. Shea*, 957 F. Supp. 331, 339 (D.N.H. 1997) (pretrial hearing showed that FBI "followed detailed testing protocols and quality control procedures in this case that conform to industry standards"), *aff'd*, 159 F.3d 37 (1st Cir. 1998), *cert. denied*, 526 U.S. 1077 (1999).

Unfortunately, the Eighth Circuit has embarked on a different path. Its decisions have applied shortcuts rather than science to the admissibility of DNA evidence. Shortly after *Daubert* was decided, the Eighth Circuit addressed the admissibility of DNA evidence in *United States v. Martinez*, 3 F.3d 1191, 1197-98 (8th Cir. 1993), *cert. denied*, 510 U.S. 1062 (1994). There, the Eighth Circuit held that "in the future courts can take judicial notice" of the reliability of "the general theory and techniques of DNA profiling." In *United States v. Johnson*, 56 F.3d 947, 952 (8th Cir. 1995), the court reiterated that judicial notice of the general theory and techniques of DNA profiling was appropriate. Then, in

United States v. Beasley, 102 F.3d 1440, 1448 (8th Cir. 1996), *cert. denied*, 520 U.S. 1246 (1997), that court of appeals held that "the PCR method of DNA analysis is sufficiently well established to permit the courts of this circuit to take judicial notice of it in future cases." Hence, federal courts within the Eighth Circuit now are authorized to take judicial notice whenever they are presented with DNA evidence based on the PCR method (the dominant method of DNA analysis today).

In these earlier decisions, the Eighth Circuit at least qualified these "judicial notice" pronouncements to some extent. In *Martinez*, *Johnson* and *Beasley*, it was very clear that the actual testing protocols had been presented in court. 3 F.3d at 1193; 56 F.3d at 952; 102 F.3d at 1445. In *Martinez*, moreover, the court emphasized that "the court should require the testifying expert to provide affidavits attesting that he properly performed the protocols involved in DNA profiling." 3 F.3d at 1198. *See also Johnson*, 56 F.3d at 952. And, in *Beasley*, the court made it clear that "the reliability of the proffered test results may be challenged by showing . . . failure to perform the appropriate protocols, and the like." 102 F.3d at 1448. Thus, while prior to this case the Eighth Circuit had gone beyond other circuits in allowing "judicial notice" to be applied to PCR DNA testing, it did not expressly permit litigants to dispense with proof of the specific test that was actually run.

The decision in this case, however, goes a step further by enabling litigants to introduce a DNA test report without ever furnishing the protocol for the test. In a criminal case within the Eighth Circuit, the government now only needs to show the "basic components" of the "testing methodology." Appendix 7a. In other words, a party can get

a DNA test report admitted into evidence with nothing more than a technician's general recollections about the basic "recipe," combined with testimony that customers have not complained about the test.

Not only does the Eighth Circuit's law in this area conflict with decisions of this Court and other circuits, but it also is at odds with the Federal Judicial Center's Reference Guide on DNA Evidence. That volume, which is intended to serve as a guidebook for federal judges, makes clear that the general acceptance of PCR-based DNA testing "does not mean that a particular laboratory has adopted a suitable protocol and is proficient in following it." *Reference Manual on Scientific Evidence* 500 (2d ed. 2000). A court must consider "laboratory-specific issues." *Id.* By contrast, the Eighth Circuit's decision makes consideration of such issues impossible. How could Dr. Boswell claim that Stormont was not "proficient" when he and his experts never had access to what it did?

The Eighth Circuit's rule also conflicts with opinions from the highest courts of several states. Although the facts and the legal standards are somewhat different here, the DNA evidence in this case suffered from one of the flaws that required reversal of a murder conviction in *Murray v. State*, 692 So.2d 157, 163-64 (Fla. 1997). In that case, the Florida Supreme Court held that a trial court had erred in admitting testimony about a DNA match between the defendant's hair and hair found at the crime scene, noting that the state's expert – while voicing platitudes about the reliability of PCR testing – was unable to answer questions about the actual procedures used in conducting the PCR DNA tests there. Likewise, in another Florida case, the court excluded DNA test results by quoting with approval a 1992 National Research Council Report:

> *The validity of assumption 4 – that the analytical work done for a particular trial comports with proper procedure – can be resolved only case by case and is always open to question, even if the general reliability of DNA typing is fully accepted in the scientific community.*

Hayes v. State, 660 So.2d 257, 263-64 (Fla. 1995) (emphasis in original). *Accord Ex Parte Hutcherson*, 677 So.2d 1205, 1209 (Ala. 1996) (holding that DNA evidence should have been rejected because of insufficient testimony concerning the reliability of test results, including a failure to testify as to quality control procedures used).

II. The Eighth Circuit Has Erroneously Decided a Critical Question of Federal Law.

While the Eighth Circuit's holding that the government does not have to offer proof of the actual "scientific" test that it conducted is troubling enough, and conflicts with the law in other circuits, there are several additional reasons why this Court should take review of this case. In the first place, this Court's *Daubert* teachings on expert testimony should apply most strongly to DNA evidence because it is so seductive to a jury. As the California Supreme Court has observed, "DNA evidence is different." *People v. Venegas*, 18 Cal.4th 47, 81 (1998) (reversing conviction due to improper admission of FBI's DNA statistical analysis). It is out of "the ken of the ordinary judge and juror." *United States v. Brien*, 59 F.3d 274, 276 (1st Cir.), *cert. denied*, 516 U.S. 593 (1995). Jurors are ill-equipped to evaluate the reliability of DNA evidence themselves, while, at the same time, a common perception exists that DNA evidence is infallible. Thus, if gatekeepers are needed anywhere, they are needed here.

Second, DNA evidence is seemingly everywhere these days. The newspapers are full of reports of crimes that have been solved, or convictions that have been reversed, based on DNA evidence. In what is clearly the most important area of forensic science today, it would be helpful for this Court to clarify what the Federal Rules of Evidence require. Citizens who live in Iowa and the other six states of the Eighth Circuit should have the same right to confront the actual test that is being used against them as citizens elsewhere in this country.

Third, the Eighth Circuit's rules on DNA evidence are singularly unscientific, but they are symptomatic of a broader problem. Because judges and lawyers are more comfortable with legal rules than scientific principles, there is an ever-present danger that *Daubert* will be applied as a mechanical, legalistic "magic word" test, much as occurred in this case and under the discredited *Frye* test. *See Frye v. United States*, 293 F. 1013, 1014 (D.C. Cir. 1923). Is the procedure "generally accepted"? Have there been "objections" to it? Answer yes to the first question, answer no to the second, and the report will be admitted.

Daubert instructs courts to assess the "reliability" of the "methodology." 509 U.S. at 592-95. That is its core requirement. But when a court allows testimony concerning customer acceptance to substitute for *proof of the actual methodology*, that is totally unscientific. Reliability "refers specifically to the ability of a second scientist to reproduce the results of an earlier experiment." Joelle Anne Moreno, "Beyond the Polemic Against Junk Science: Navigating the Oceans that Divide Science and Law with Justice Breyer at the Helm," 81 *Boston U. L. Rev.* 1033, 1067 (2001). Hence, there can be no reliability without proof of what was done.

This began as a case about pseudorabies, but it has become a case about pseudoscience. The decision in this case sends a clear signal that the government can try criminal cases that involve the latest science without scientific methods or scientists – simply bringing in technicians who can say they ran the tests (which they don't remember), that they ran those tests before, and that no one has complained about them (to their limited knowledge). This Court should reverse that message.

CONCLUSION

For all the above reasons, Dr. Boswell respectfully requests that this Court grant his petition for a writ of certiorari and thereby review the judgment and opinion of the Court of Appeals below.

Respectfully submitted,

EDWARD M. MANSFIELD
Counsel of Record
BELIN LAMSON MCCORMICK
ZUMBACH FLYNN
A Professional Corporation
666 Walnut Street
2000 Financial Center
Des Moines, IA 50309-3989
(515) 243-7100
Attorneys for Petitioner

APPENDIX

APPENDIX A — OPINION OF THE UNITED STATES COURT OF APPEALS FOR THE EIGHTH CIRCUIT DATED AND FILED OCTOBER 16, 2001

UNITED STATES COURT OF APPEALS FOR THE EIGHTH CIRCUIT

No. 00-4005

United States of America,

Plaintiff/Appellee,

v.

Bradley Wayne Boswell,

Defendant/Appellant.

Submitted: May 15, 2001
Filed: October 16, 2001

Appeal from the United States District Court for the Southern District of Iowa.

Before WOLLMAN, Chief Judge, HANSEN, Circuit Judge, and SCHREIER,[1] District Judge.

SCHREIER, District Judge.

Dr. Bradley Wayne Boswell appeals his conviction on two counts of making false statements to the government.

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1. The Honorable Karen E. Schreier, United States District Judge for the District of South Dakota, sitting by designation.

Appendix A

Dr. Boswell raises three issues on appeal. First, that the district court[2] erred in admitting evidence of DNA test results involving the comparison of swine serum samples. Second, that the evidence was insufficient to support the conviction on grounds he falsified the number of swine he claimed to have bled. Third, that Dr. Boswell was denied due process because the refrigerated serum samples deteriorated while kept in storage. We affirm.

Pseudorabies is a contagious air-transmitted disease that causes respiratory and reproductive problems in swine. The Pseudorabies Eradication Program is a joint federal, state, and swine industry project designed to eradicate the disease. The program pays veterinarians on a "fee-basis" to collect blood samples from swine on Iowa farms and submit the samples to the Iowa State University Diagnostic Laboratory. The veterinarians receive $20 for each farm visit and $4.50 per animal from which a blood sample is drawn.

Dr. Bradley Boswell was a licensed veterinarian at the time of the events in question. Dr. Boswell's license was reinstated after it had been revoked by the Iowa Board of Veterinarian Medicine in 1991, for submitting falsified test records, failing to properly supervise employees, and violating food and drug regulations regarding use of illegal animal drugs.

Dr. Boswell agreed to work with the Animal Plant Health Inspection Service (APHIS) as a "Fee Veterinarian" under the Pseudorabies Control Agreement. Dr. Alison King, a field

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2. The Honorable Harold D. Vietor, United States District Judge for the Southern District of Iowa.

veterinarian employed by APHIS, asked Dr. Boswell in early 1998 to obtain serum samples from pigs on Thad Benskin's farm. Dr. Boswell claims he bled some of the samples in February of 1998 with the assistance of Thad Benskin, and later returned to the farm and bled the rest of the animals with the help of his friend Bart Elder. In total, Dr. Boswell submitted one hundred and twenty samples from the Benskin farm to the ISU laboratory. Some of the blood serum samples tested positive for psuedorabies.

Dr. Boswell was surprised to learn that some of the samples had tested positive for pseudorabies. He then resubmitted allegedly identical samples to the ISU laboratory, claiming that he used the serum kept on reserve from the prior month's bleeding. All of the resubmissions came back negative. Dr. Boswell also claims he decided to re-bleed and re-submit sixty samples from the Benskin farm. New samples arrived at the ISU lab on March 10 which also tested negative.

Dr. King was suspicious that test results from the same animal could move from positive to negative. Based on this suspicion, King and a group of federal veterinarians re-tested some of the swine on the Benskin farm. The federal investigators drew blood from a random sample of thirty sows and approximately 40 percent of the thirty sows tested positive for pseudorabies.

Dr. King then sent Dr. Boswell's original and resubmitted samples to the National Veterinarian Service Laboratory (NVSL). A lab technician at NVSL concluded that the original and resubmitted samples appeared to be adulterated. NVSL was also skeptical of Dr. Boswell's assertions that the sets of

samples he submitted were from the same animal. NVSL sent some of the two sets of samples to Stormont Laboratories for additional testing. Stormont tested the DNA of Dr. Boswell's submissions by using a process called polymerase chain reaction (PCR). Stormont concluded that the paired samples were not from the same animals.

Dr. Boswell was charged by indictment with nine counts of making false statements and two counts of witness tampering. Count Two was dismissed at the government's request prior to trial. The district court entered a judgment of acquittal on the two counts of tampering with a witness and the jury acquitted Dr. Boswell of six counts of making a false statement. The jury convicted Dr. Boswell on two counts of making false statements in violation of 18 U.S.C. § 1001 (Counts Four and Five). These two counts of conviction involved separate written representations Dr. Boswell made on separate official government Pseudorabies Serology Forms with respect to the Benskin swine herd. Count Four charged that Dr. Boswell's written statement on the February 1998 form that he had obtained the 120 blood samples from the Benskin herd in February 1998 was false because Dr. Boswell "well knew that he had bled less (sic) than 120 swine." Count Five charged that the form submitted in March 1998, with the thirty blood samples from serum that Dr. Boswell claimed were from the same hogs bled at the Benskin farm in February 1998, was false because he then "well knew these [thirty] specimens were not from the same swine, and that he had not submitted specimens in accordance with federal and state regulations and instructions issued by the Veterinarian-in-Charge."

Appendix A

I.

Dr. Boswell contends the district court abused its discretion by admitting into evidence DNA test results taken from swine serum samples Dr. Boswell submitted to ISU laboratories. A district court's admission of DNA evidence is reviewed under an abuse of discretion standard. *See United States v. Beasley*, 102 F.3d 1440, 1445 (8th Cir. 1996), *cert. denied*, 520 U.S. 1246 (1996). This court must determine whether or not the district court made a clear error of judgment in weighing the facts on the basis of the record before it. *See United States v. Bahema*, 223 F.3d 797, 809 (8th Cir. 2000).

The admission of scientific expert testimony is dependent upon the court's determination that the proposed testimony constitutes (1) scientific knowledge that (2) will assist the trier of fact to understand or determine a fact in issue. *See Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579, 113 S. Ct. 2786, 125 L. Ed. 2d 469 (1993). The district court serves as a "gatekeeper" for the admission of novel scientific evidence. *See United States v. Martinez*, 3 F.3d 1191, 1196 (8th Cir. 1993). The district court must conduct a preliminary assessment of whether the reasoning or methodology underlying the testimony is scientifically valid and whether that reasoning can be applied to the facts at issue. *See Daubert*, 509 U.S. at 591, 113 S. Ct. at 2796. The factors the district court may consider include: (1) whether a theory or technique can be (and has been) tested; (2) whether the theory or technique has been subjected to peer review and publication; (3) the known or potential rate of error; and (4) whether the technique is generally accepted. *Id.* at 593-94, 113 S. Ct. at 2795-96.

Appendix A

There is sufficient evidence that the district court was justified in permitting the admission of PCR test results of the swine DNA. First, the PCR process is approximately ten years old and it has undergone extensive testing. *See United States v. Gaines*, 979 F. Supp. 1429, 1435 (S.D. Fla. 1997). Numerous courts have recognized the multitude of scientific articles endorsing the use of PCR analysis for forensic purposes. *See id.* at 1436. This court previously found PCR testing to be an accurate method of analysis when a protocol that conforms to guidelines accepted by members of the forensic community are followed and controls are employed. *See Beasley*, 102 F.3d at 1446. While the *Beasley* analysis applied to PCR testing of human DNA, there is no evidence the district judge erred by extending the same analysis to PCR testing of swine blood. In fact, Michael Spencer, a scientist with a biotechnology company called Celera Aggen, testified that the method of PCR testing on swine DNA is an acceptable and recognized test in the DNA testing community.

Dr. Boswell asserts that Michael Spencer's "backhand (and incompetent) testimony" regarding the PCR method of DNA testing and the protocol at Stormont did not lay sufficient foundation for the admission of the lab results. The record does not support Dr. Boswell's characterization of Mr. Spencer's testimony. Mr. Spencer is a biochemist from the University of California, at Davis. After graduation Mr. Spencer was employed by the University of California, at Davis, in the department of biological chemistry at the School of Medicine. Mr. Spencer was later employed at Stormont from 1992 until 1998 and was involved solely in animal DNA testing.

Dr. Boswell also contends that even if the PCR method of DNA testing on swine blood is accepted in general, the results would still be inadmissible in this case because no protocol was followed. This assertion is not supported by the record. Although no written protocol for the analysis of swine blood at Stormont was introduced, Mr. Spencer did describe the method and procedures used to do the PCR analysis and, as mentioned above, verified that the procedure was an accepted one among DNA experts. Mr. Spencer testified that he performed the DNA tests on the blood samples submitted by Dr. Boswell and he detailed the reacting components he used in the process. Mr. Spencer also stated that the methodology he used is like a recipe where the amount of an ingredient may be varied, but the testing methodology has the same basic components. Dr. Boswell further argues that the test was not reliable given the condition of the samples. This assertion is contradicted by Mr. Spencer who stated that the samples were delivered in a sealed container by express courier and were then stored in a secure laboratory refrigerator.

This court previously held that any alleged deficiencies must so alter the PCR methodology as to make the test results inadmissable. *See Beasley*, 102 F.3d at 1448. Dr. Boswell failed to prove that there were significant deficiencies in the protocol and procedure used by Stormont Laboratories. Consequently, the alleged deficiencies go to the weight to be given the DNA evidence, not its admissibility. *See id.; United States v. Johnson*, 56 F.3d 947, 953 (8th Cir. 1995). We, therefore, conclude that the district court did not abuse its discretion in admitting the government's DNA evidence.

Appendix A

II.

Dr. Boswell claims there was insufficient evidence for a reasonable jury to have found that he falsified Pseudorabies Serology Forms by overstating the number of animals he bled. This court examines the evidence in the light most favorable to the government and provides the government with the benefit of all reasonable inferences. *See United States v. Wilson*, 49 F.3d 406, 409 (8th Cir. 1995). The jury's verdict must be upheld if any interpretation of the evidence allows a reasonable jury to find guilt beyond a reasonable doubt. *See United States v. Easley*, 70 F.3d 65, 67 (8th Cir. 1995).

Count Four of the indictment alleges that Dr. Boswell falsified the number of swine he claims to have bled at the Benskin farm. Dr. Boswell asserts that viewed in the light most favorable to the government, it must be concluded that Dr. Boswell bled forty-sixty pigs with Thad Benskin and later returned to the Benskin farm and bled "a lot" of pigs with Bart Elder. Dr. Boswell contends that based on this premise a reasonable jury could not have found a calculation that he bled 120 pigs was an overstatement. The court disagrees. First, there is evidence in the record that Mr. Elder never stepped foot on the Benskin farm, let alone bled pigs there. Second, even if this court were to accept this premise of Dr. Boswell, the conclusion that a reasonable jury must equate "a lot of pigs" with sixty to eighty pigs is wrong. We, therefore, conclude a reasonable jury could have determined that Dr. Boswell did not return to the Benskin farm with Mr. Elder, or that if he did visit the farm, he did not bleed sixty to eighty pigs.

Dr. Boswell's next assertion is that no reasonable jury could have reached the conclusion that when he submitted the serology form for the thirty samples of the resubmission, he knew they were not a resubmission of the thirty prior samples from the Benskin farm, as was alleged in Count Five. The first thirty samples that Dr. Boswell submitted were received by ISU laboratory on February 21, 1998, and the second set of thirty samples were received on March 3, 1998. Dr. Boswell contends the samples were from the same swine and the same bleeding. Dr. Boswell's assertion is contradicted by the scientists who received the submitted and resubmitted samples. The DNA tests conducted by Stormont provided evidence that the samples originally submitted by Dr. Boswell were not from the same animals as the second submission. We, therefore, conclude that a reasonable jury could have determined Dr. Boswell falsified the submissions.

III.

Dr. Boswell contends that Counts Four and Five should have been dismissed because the government knowingly allowed the swine serum samples to degrade. We defer to the district court's factual findings with regard to the destruction of evidence. *See United States v. Clark*, 980 F.2d 1143 (8th Cir. 1992). A clearly erroneous standard of review must be applied to the district court's determination that the government acted in good faith. *See United States v. Ramos*, 27 F.3d 65, 67 (3d Cir. 1994); *United States v. Bohl*, 25 F.3d 904, 909 (10th Cir. 1994).

Dr. Boswell asserts that the government exhibited bad faith by knowingly allowing the swine serum samples to

deteriorate. This presumption is contradicted by the affidavit of Dr. Boswell's expert witness, Dr. Christopher Chase. Dr. Chase states that: "In order for the samples of blood or serum to remain in a condition which would accurately reflect the sample was in the same in vivo condition from the animal, the samples must remain either refrigerated or frozen." The samples in question were preserved in such a manner for testing according to the policies of ISU laboratories and NVSL personnel, and despite these efforts the samples deteriorated naturally over the course of time.

The Due Process Clause of the Fourteenth Amendment does not require that law enforcement agencies preserve samples in order to introduce the results at trial. *See California v. Trombetta*, 467 U.S. 479, 491, 104 S. Ct. 2528, 81 L. Ed. 2d 413 (1984). Unless the defendant can show bad faith on the part of law enforcement, "failure to preserve potentially useful evidence does not constitute a denial of due process of law." *Arizona v. Youngblood*, 488 U.S. 51, 58, 109 S. Ct. 333, 337, 102 L. Ed. 2d 281 (1988). Dr. Boswell had the opportunity to raise the issue of the evaporated serum at trial and to impeach the reliability of the test results, and therefore had the opportunity to raise doubts in the mind of the jury. Furthermore, the immediate case is distinguishable from the case cited by Dr. Boswell, *United States v. Bohl*, 25 F.3d 904 (10th Cir. 1994). The government intentionally destroyed evidence in *Bohl*. There is no record of that occurring in this case. We conclude that Dr. Boswell was not deprived of his due process rights by the degradation of the swine samples.

Appendix A

The judgment is affirmed.

A true copy.

ATTEST:

CLERK, U.S. COURT OF APPEALS,
EIGHTH CIRCUIT.

APPENDIX B — ORDER OF THE UNITED STATES COURT OF APPEALS FOR THE EIGHTH CIRCUIT DENYING THE PETITION FOR REHEARING AND FOR REHEARING EN BANC DATED DECEMBER 7, 2001

UNITED STATES COURT OF APPEALS FOR THE EIGHTH CIRCUIT

No. 00-4005

United States of America,

Appellee,

v.

Bradley Wayne Boswell,

Appellant.

Order Denying Petition for Rehearing and for Rehearing En Banc

The petition for rehearing en banc is denied. Judge McMillian and Judge Bye would grant the petition.

The petition for rehearing by the panel is also denied.

(5128-010199)

December 7, 2001

Order Entered at the Direction of the Court:

Clerk, U.S. Court of Appeals, Eighth Circuit

APPENDIX C — EXCERPTS OF TRIAL TESTIMONY AND RULING OF DISTRICT COURT DATED AUGUST 30, 2000

IN THE UNITED STATES DISTRICT COURT
FOR THE SOUTHERN DISTRICT OF IOWA
CENTRAL DIVISION

Cr. No. 00-104

UNITED STATES OF AMERICA,

Plaintiff,

vs.

BRADLEY WAYNE BOSWELL,

Defendant.

EXCERPTS OF TRIAL TESTIMONY AND RULING OF DISTRICT COURT

August 30, 2000

BEFORE: THE HONORABLE HAROLD D. VIETOR, Senior Judge, and a Jury.

[472] BY MR. BEAMER:

Q. As to the actual tests that you ran, did you have a guide or a procedure that you followed when you were at Stormont Laboratory?

A. Yes, sir.

Q. Would you tell the jury what type of material you used in that process?

A. Simply a guideline, just like a recipe, is another way we refer to these, just telling us how much of what to put into the reaction, and essentially what conditions to run the reaction in.

Q. Do they still have that document at Stormont, to your knowledge?

A. They may still have it, but we're unable to find it since they've changed some things since I was there.

Q. Are they still engaged in DNA testing for swine at [473] Stormont, to your knowledge?

A. Evidently not.

* * *

[478] MR. BEAMER: I would offer into evidence at this time, Your Honor, Government's Exhibit 72, 72A and 73.

(Government Exhibits 72, 72A and 73 were offered in evidence.)

MR. McCONVILLE: I'm going to object to that at this time, Your Honor, because there has not been a proper foundation laid at this point to testify — or in evidence as to how these tests were performed or what was done, and there hasn't been any showing or foundation or relevancy that they were done

within a reasonably accredited scientific method since there is no protocol here that has been shown or presented in evidence at this point under which they were completed.

THE COURT: Sustained.

* * *

[484] MR. BEAMER: Your Honor, I would offer again Exhibits 72, 72A and 73 through this witness.

(Government Exhibits 72, 72A and 73 were offered in evidence.)

MR. McCONVILLE: May I voir dire the witness, Your Honor, for purposes of an objection?

THE COURT: Yes.

VOIR DIRE EXAMINATION

BY MR. McCONVILLE:

Q. So as I understand it, sir, you said that you used some of the things in the two exhibits, 68 and 69, and then you modified those?

A. That's correct.

Q. And the modifications you used are not a recognized procedure, is that correct?

A. No, recognized — there is no recognition one way or the other.

MR. McCONVILLE: On that basis, Your Honor, I'm going to object to these. There hasn't been any proper foundation laid, and for the reason that there is no showing at this point that the procedure that they used--first of all, there hasn't been a showing as to what the procedure was. They've talked about using a regular procedure, but we don't know what it is.

Second of all, he's testified that it wasn't a recognized medical procedure — excuse me — recognized scientific procedure, and I would object for that reason.

THE COURT: I'm going to ask the jurors to go over to the jury room. I need to confer with the lawyers about this matter. Leave your note pad on your chair, and we'll bring you back when we're ready for you.

* * *

[489] THE COURT: I might say this: I think you know there's no question that DNA testing results are basically admissible at a trial. The question is not is DNA —

MR. McCONVILLE: I understand that.

THE COURT: — admissible. The question is whether the methodology used by this witness in doing his DNA testing is a methodology that is sufficiently acceptable that the Court can find that his testimony as to the tests and the results is reasonably reliable.

I'm trying to get a little better handle on the testing that was done and the method that was used, how the method

used by the witness varied from any standard methodology [490] or procedures, and if the methodology followed by him and his procedures have been utilized on other occasions and if the validity of the results have been ascertained. I would like to have counsel proceed with further questioning of this witness out of the presence of the jury at this time to explore that.

* * *

[491] **DIRECT EXAMINATION (Resumed)**

BY MR. BEAMER:

Q. Have you used this methodology on other occasions?

A. The pig methodology?

Q. Yes.

A. Yes.

Q. Now, on how many other occasions, and has it ever been — I mean did anybody —

THE COURT: Why don't we do one question at a time. How many have you done?

BY MR. BEAMER:

Q. How many have you done?

A. It was a procedure that we used for any pig sample that came in, so probably into the hundreds, at times.

Q. Has that procedure ever been challenged by anyone?

A. No, sir.

Q. Was it accepted in the community as an acceptable and recognized test that Stormont performed?

A. Yes, it is.

[492] Q. Who were your clients?

A. Our clients would be universities or breed registries or government agencies or even just individuals.

Q. And this type of test — this type of photographic process that you have described for the Court is the same type of methodology and testing that was used in those other tests?

A. Document 73?

Q. Yes.

A. Yes, that's standard.

Q. And 72 and 72A?

A. Correct.

Q. How long were you at Stormont Laboratory?

A. Six years and two months.

Appendix C

Q. Was there ever a challenge, on one occasion, that this procedure was unacceptable or your methodology was in error?

A. Not to my knowledge.

• • •

[499] THE COURT: May I ask a few questions?

MR. BEAMER: Yes, Your Honor, certainly.

THE COURT: The methodology that you use, of your own personal knowledge, how many other biochemists and people performing DNA analysis use the same methodology?

THE WITNESS: Probably well into the hundreds. It's like a recipe. You can vary the amount of an ingredient, but you have to have the same component, so around the world, several hundreds of thousands. Whoever does PCR has to have the same basic components.

THE COURT: You indicated the methodology you employed varied somewhat from the published methodology that is in one of these documents. I don't think it's been offered as an exhibit. Am I correct?

THE WITNESS: I believe.

THE COURT: That testimony was in response to testimony asked by defense counsel.

THE WITNESS: Yes, we made some variations.

THE COURT: Can you articulate in what respects did the methodology you applied vary from that methodology?

THE WITNESS: Yes. One basic component is magnesium, [500] and depending on whoever is running it and what kind of enzyme they're using, they vary the amount of magnesium, so that is something that when we were running the test, we would change the magnesium concentration to fit the brand of enzyme we were running.

You have many manufacturers of the same enzyme, but they all have slightly different reactions with what they run optimally under, and so we changed the magnesium to what amplified the best or what worked the best in our condition.

THE COURT: Any other variations?

THE WITNESS: Other than the magnesium, there would always be the D and TP's, which are a component in the reaction, and then the reaction volume. Reaction volume, some people just use large scales because maybe they have the money for that, and then maybe the temperature, which is also dependent upon the equipment used.

THE COURT: Are the users of your services or are some of the users of your services acquainted with the specific methodology you use?

THE WITNESS: Yes.

THE COURT: And who are some of those users?

THE WITNESS: Some of the breed registries I believe have scientific advisers.

THE COURT: Some of the who?

THE WITNESS: Breed registries. The big breed [501] organizations would have scientific advisers, and on different occasions, they would come and visit the lab to see what we were doing.

THE COURT: And they were then--they then became familiar with the methodology that you used?

THE WITNESS: I don't know to what degree they became familiar, but they did take a look.

THE COURT: Would any users be knowledgeable or familiar with the methodology that you use?

THE WITNESS: For pigs, I don't believe so.

* * *

[502] **CROSS-EXAMINATION**

BY MR. McCONVILLE:

Q. You talked about the variations that you used. Were they variations from the original protocol that you had for swine at [503] Stormont?

A. No. They were variations from the published paper that the sequences came in.

Q. So the Stormont protocol played no part in these tests?

A. No. They were the procedures followed, Stormont procedures.

Q. Are you saying, then, that Stormont procedures are the same as in Exhibit 68 and 69, the two articles that you —

A. I am not.

Q. I guess I don't understand, then. Where can I look at? What do you have that I can look at to show what those were?

A. That would be the protocol at Stormont, at Stormont.

Q. You don't have that?

A. That's correct.

Q. Do you recall what that was?

A. Do I recall what it was?

Q. Yes, sir.

A. Yes, sir. It was a typed page that listed the reaction components.

Q. But I mean you don't know what that was exactly?

A. I could not reproduce it from my head, no.

Appendix C

Q. So your variations that you're talking about in answering the questions are variations to that protocol?

A. The variations found in the protocol.

Q. Variations that were part of the protocol itself, then?

[504] A. Correct.

Q. Was the protocol a protocol just for pigs, or was it a protocol for any animal?

A. It was just for pigs.

* * *

Q. Was the number of reactions or number of types of reactions that you would attempt to get different in the protocol?

A. Different in the pig protocol?

Q. Yes, sir.

[505] A. From other protocols?

Q. Yes, sir.

A. And you had two questions, the number of reactions and the —

Q. Well, let's start with number.

A. No.

Q. Was the type of reaction different?

A. And by "type," meaning the changes in reaction components?

Q. Yes, sir.

A. Yes.

* * *

[506] THE COURT: Very well. When I was a boy, I used to help sort hogs. That involved standing at a gate and opening the gate and closing the gate to let certain hogs through the gate and keep other hogs from getting through the gate, and now under Daubert, I'm gatekeeping on hogs again, I guess. At least I'm gatekeeping on hog serum.

The evidence satisfies me that the — We know this: It's well-established that DNA testing results are admissible as a general matter. The question is whether or not the methodology used here, the procedures are such that the Court finds them sufficiently reliable to allow the jury to hear the evidence, and I am satisfied that the methodology used here is such that the results are reasonably reliable, and the evidence will be received.

* * * *